



PROPRIETARY D.

Restricted Distribution
(First & Last Name-Location Code)

Master File
Specifications
Literary

EOL 00000

Tammy Fisher

LABORATORY REQUEST
NEENAH TECHNICAL CENTER

Requested by and Location	Request Date
J Zhang NTC	[REDACTED]
Enc Use Application	Plant/Location Code
Shrink Bag	240
Project Number	Plant Order Number
LR-200	-
Spec # or E# or ES#	Customer
E-15409-93	-
Process	Competitor (CA only)
Saran	-

Objective

Dow CGCT Polymer Evaluation

Sample Identification and Structures

V1	Control	80/10/10	in sealing layer for 3 layers
V2	Dow CGCT 2A37	in ..	" "
V3	90/10	2A37/97.06	in .. " bag
V4	80/20	.. / .. in
V5	80/10/10	97.06/318.96/2A37	in
V6	70/20/10	97.06/2A37/31.92	in

Data Requested (Test Method and Conditions):

- * Puncture 6mm probe 10/min rate, in to out
- * Optics: → transparency, gloss, clarity
- * MST @ 40psi, 1 sec. dwell
- * Seal Strength (seal at ~~220°F~~ ~~230°F~~, 250°F and 265°F) Shrink free at 200 and 180°F
- * Impact, probe toward sealant
- * Thickness / layer ratio

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Assigned to	Notebook Reference	Completion Date	Report Number
Pat Griedl	RD5465 p. 143-147 and p. 150-152.	[REDACTED]	9029-3

fracture, I. notched, 6 m.m. prob, in to out, lbs.

1. 7.9	2. 11.6	3. 12.3	4. 13.6	5. 8.6	6. 8.6
8.3	12.2	13.8	13.0	9.1	9.4
8.8	11.0	13.6	12.0	8.5	8.5
8.3	11.0	12.9	11.3	9.5	9.5
7.8	12.3	13.9	12.4	9.4	8.4
8.2	11.1	13.9	12.8	8.8	8.4
<u>8.2</u>	<u>11.5</u>	<u>13.4</u>	<u>12.5</u>	<u>9.0</u>	<u>8.8</u>

Seal curve, sealant to sealant, I-notched, 90° angle of separation, supported tail, sealed at various temperatures, 40 psig, 1 sec. dwell, 16x1" width.

1. 2. ④ 3. ④ 4. ④ 5. 6.

225°F.	2.7	Below	Below	Below	3.3	
	3.2	MST.	MST.	MST.	2.5	Below
	2.4		MST.	MST.	4.0	MST.
	3.5				2.9	
	2.3				1.7	
	<u>2.6</u>	X	X	X	2.9	X

240°F.	4.50	3.0	3.10	3.0	4.65	4.50
	3.25	3.2	2.95	3.4	5.05	3.65
	4.90	1.2	3.20	3.9	5.30	4.70
	3.90	3.0	3.20	3.2	5.15	4.70
	2.60	4.6	—	4.3	5.15	4.70
	<u>3.8</u>	<u>3.0</u>	<u>3.1</u>	<u>3.6</u>	<u>5.1</u>	<u>4.4</u>

250°F.	4.60	2.60	5.40	4.25	5.4	4.95
	5.05	2.45	5.70	4.65	5.5	4.65
	4.80	2.70	3.95	3.50	5.0	4.60
	5.10	3.25	4.10	5.40	4.8	4.60
	4.45	2.90	3.20	4.30	5.1	5.30
	<u>4.8</u>	<u>2.8</u>	<u>4.5</u>	<u>4.4</u>	<u>5.2</u>	<u>4.8</u>

265°F.	4.85	2.40	3.85	5.20	4.85	5.00
	5.10	2.75	4.00	4.50	4.40	4.90
	4.95	2.70	4.40	4.85	4.80	4.95
	5.50	2.70	3.75	4.70	4.80	4.70
	4.55	3.25	4.00	4.55	4.40	4.80
	<u>5.0</u>	<u>2.8</u>	<u>4.0</u>	<u>4.8</u>	<u>4.60</u>	<u>4.9</u>

Weld type and faster than film tree-off at 10 sec.

(P) Variables 2, 3 & 4 were extremely costly toward the subject side which made it very difficult to produce the desired seal.

9029.3.

minimum seal temperature,
tentacle sealer, 40 psig, 1 sec. dwell,
minimum temperature required to
produce a good seal, °F

1. 225
2. 240
3. 240
4. 240
5. 225
6. 230

Thickness, TMI, mils

1. 2.06	2. 2.23
2.05	1.96
2.34	2.08
2.16	2.47
2.03	2.36
2.10	2.45
2.12	2.26

3. 2.63 4. 2.48

2.61 2.60

2.65 2.21

2.54 2.42

2.70 2.41

2.77 2.41

2.65 2.42

2.65 2.42

Hue, %

1. 7.31	2. 5.35	3. 6.75	4. 4.88	5. 5.90	6. 5.71
7.19	5.66	8.80	5.91	5.51	5.70
6.87	5.65	7.71	7.54	4.63	4.87
7.88	5.75	6.99	6.03	5.62	4.95
6.85	6.07	6.19	6.18	5.80	6.62
6.46	5.85	7.32	5.86	5.70	5.91
7.1	5.7	7.3	6.1	5.5	5.6

5. 2.37 6. 2.25

2.22 2.11

Glass, 45° angle, outside, units.

2.23 2.05

1. 66.7	2. 74.8	3. 66.5	4. 75.5	5. 73.6	6. 73.3
64.5	75.9	66.7	68.9	76.2	72.5
67.0	72.6	65.0	73.4	76.9	74.5
64.2	75.5	73.8	74.3	73.6	73.5
70.0	78.6	75.0	73.9	73.1	68.4
69.2	78.2	70.3	73.1	74.4	72.6
66.9	75.9	69.5	73.2	74.6	72.4

Clarity, %

1. 54.4	2. 54.8	3. 59.0	4. 44.4	5. 57.8	6. 57.6
55.6	39.2	48.8	44.0	48.4	45.6
61.6	47.8	46.9	48.8	46.2	66.0
52.4	64	57.0	64.6	53.4	65.0
57.4	50.2	44.2	52.4	48.0	56.8
63.2	55.0	17.0	44.8	60.4	63.0
57.4	42.2	38.7	49.8	52.4	59.0

9029-3.

Temperature, ° F.	Sample	Specimen	Thickness, mils	Shrink	
				N.D.	C.M.D.
180°F.	1	1	1.99	10	28
		2	2.01	13	29
		3	2.10	12	27
	2	1	2.00	16	31
		2	2.12	16	30
		3	2.35	16	31
	3	1	2.31	18	26
		2	2.40	18	28
		3	2.40	19	27
	4	1	2.06	19	29
		2	2.19	19	28
		3	2.24	20	28
	5	1	2.12	11	25
		2	2.21	13	26
		3	2.34	12	25
	6	1	2.02	13	26
		2	2.17	12	26
		3	2.20	12	25

9C29-3.

Temperature, ° F.	Sample	Specimen	Thickness, mils	Shrinkage	
				N.D.	9 Shrink C.M.D.
200° F.	1	1	1.96	35	53
		2	1.98	33	54
		3	2.18	36	54
	2	1	1.98	31	54
		2	2.28	29	52
		3	2.37	32	52
	3	1	2.23	40	53
		2	2.32	37	52
		3	2.42	37	53
	4	1	2.02	38	51
		2	2.14	38	52
		3	2.33	38	52
	5	1	2.07	33	52
		2	2.13	35	53
		3	2.30	34	52
	6	1	2.09	34	52
		2	2.11	34	52
		3	2.18	37	55

Best Available Copy

E. A. I. T Sys em

DISK FILE = STATISTICS DATA
 OPERATOR = PLG
 MATERIAL ID = V-1
 SAMPLE ID = V1

COMMENT = ZHENG
 RUN COMMENT = Probe toward sealant (in)

09:55:18

LOAD CELL =
 TUP RADIUS =
 DART WEIGHT =
 TEMPERATURE =

500-3933
 0.750 in
 35.00 lb

73 °F

TEST	@PEAK LOAD					TOTAL
	D	L	E	PEAK D	ZERO E	
9029-3.S01	1.240	39.7	2.33	0.185	0.39	1.425 2.73
9029-3.S02	1.425	39.7	2.94	0.100	0.17	1.525 3.11
9029-3.S03	1.105	39.0	2.03	0.490	0.92	1.595 2.95
9029-3.S04	1.420	38.8	2.75	0.130	0.37	1.550 3.13
9029-3.S05	1.190	36.4	2.11	0.310	0.91	1.500 3.02
9029-3.S06	1.415	41.4	2.94	0.350	1.13	1.765 4.06
Avg	1.299	39.2	2.52	0.261	0.65	1.560 3.17
STD DEV	0.139	1.6	0.41	0.15	0.38	0.12 0.46
COEF VAR	10.72	4.1	16.31	57.28	59.02	7.39 14.61

E. A. I. T System

DISK FILE = STATISTICS DATA
 OPERATOR = PLG
 MATERIAL ID = V-2
 SAMPLE ID = V2

COMMENT = ZHENG
 RUN COMMENT = Probe toward sealant (in)

02-23-1993

10:08:12

LOAD CELL =
 TUP RADIUS =
 DART WEIGHT =

500-3933
 0.750 in
 35.00 lb

TEMPERATURE =

73 °F

TEST	@PEAK LOAD					TOTAL
	D	L	E	PEAK D	ZERO E	
9029-3.S01	1.840	70.5	5.93	0.035	0.13	1.875 6.06
9029-3.S02	1.710	59.8	5.13	0.035	0.09	1.745 5.22
9029-3.S03	2.150	66.7	6.67	0.035	0.14	2.185 6.82
9029-3.S04	2.160	66.9	6.46	0.015	0.04	2.175 6.50
9029-3.S05	0.005	213.3	0.09	0.140	2.40	0.145 2.49
9029-3.S06	2.170	71.2	7.13	0.015	0.03	2.185 7.16
Avg	1.673	91.4	5.23	0.046	0.47	1.718 5.71
STD DEV	0.839	59.8	2.61	0.05	0.94	0.79 1.71
COEF VAR	50.19	65.4	49.90	102.90	199.45	46.15 30.04

E. A. I. T System

DISK FILE = STATISTICS DATA
 OPERATOR = PLG
 MATERIAL ID = V-3
 SAMPLE ID = V3

COMMENT = ZHENG
 RUN COMMENT = Probe toward sealant (in)

02-23-1993

10:24:09

LOAD CELL =
 TUP RADIUS =
 DART WEIGHT =

500-3933
 0.750 in
 35.00 lb

TEMPERATURE =

73 °F

TEST	@PEAK LOAD					TOTAL
	D	L	E	PEAK D	ZERO E	
9029-3.S01	2.395	93.7	9.94	0.030	0.12	2.425 0.06
9029-3.S02	2.315	85.4	9.39	0.035	0.17	2.350 9.56
9029-3.S03	2.320	85.6	8.59	0.050	0.24	2.370 8.83
9029-3.S04	2.305	84.9	8.97	0.025	0.09	2.330 9.06
9029-3.S05	1.885	81.6	6.90	0.040	0.17	1.925 7.07
9029-3.S06	2.170	91.1	8.98	0.030	0.11	2.200 9.09
Avg	2.232	87.0	8.79	0.035	0.15	2.267 8.95
STD DEV	0.185	4.4	1.03	0.01	0.06	0.18 1.02
COEF VAR	8.28	5.1	11.77	25.56	36.07	8.08 11.38

Best Available Copy

DISK FILE = STATISTICS DATA
 OPERATOR = PLG
 MATERIAL ID = V-4
 SAMPLE ID = V4

COMMENT = ZHENG
 RUN COMMENT = Probe toward sealant (in)

System

LOAD CELL =
 TUP RADIUS =
 DART WEIGHT =
 TEMPERATURE =

10:34
 500-3
 0.750
 35.00

TEST

	D	SPEAK LOAD	L	E	PEAK D	-->	ZERO E	TOTAL D	E
9029-3. S01	2. 175	79. 2	8. 14	0. 040	0. 19			2. 215	8. 33
9029-3. S02	2. 325	78. 5	8. 47	0. 035	0. 14			2. 360	8. 61
9029-3. S03	2. 045	74. 7	7. 16	0. 025	0. 11			2. 070	7. 27
9029-3. S04	2. 195	80. 6	7. 96	0. 045	0. 25			2. 240	8. 21
9029-3. S05	1. 690	64. 6	4. 98	0. 040	0. 10			1. 730	5. 08
9029-3. S06	2. 230	78. 8	8. 04	0. 040	0. 16			2. 270	8. 20
AVG	2. 110	76. 1	7. 46	0. 037	0. 16			2. 148	7. 62
STD DEV	0. 225	5. 9	1. 29	0. 01	0. 06			0. 23	1. 32
COEF VAR	10. 65	7. 8	17. 27	18. 38	36. 35			10. 49	17. 36

E - A - I - T System

DISK FILE = STATISTICS DATA
 OPERATOR = PLG
 MATERIAL ID = V-5
 SAMPLE ID = V5

COMMENT = ZHENG
 RUN COMMENT = Probe toward sealant (in)

02-23-1993

LOAD CELL =
 TUP RADIUS =
 DART WEIGHT =

10:44:32
 500-3933
 0.750 in
 35.00 1.

TEST

	D	SPEAK LOAD	L	E	PEAK D	-->	ZERO E	TOTAL D	E
9029-3. S01	1. 740	44. 5	4. 14	0. 055	0. 16			1. 795	4. 29
9029-3. S02	1. 270	52. 0	2. 92	0. 150	0. 49			1. 420	3. 41
9029-3. S03	1. 445	48. 2	3. 35	0. 045	0. 11			1. 490	3. 47
9029-3. S04	1. 615	45. 6	3. 71	0. 100	0. 29			1. 715	4. 00
9029-3. S05	1. 655	46. 8	3. 92	0. 045	0. 11			1. 700	4. 03
9029-3. S06	1. 395	43. 5	2. 90	0. 105	0. 24			1. 500	3. 14
AVG	1. 520	46. 8	3. 49	0. 083	0. 23			1. 603	3. 72
STD DEV	0. 179	3. 0	0. 52	0. 04	0. 14			0. 15	0. 45
COEF VAR	11. 75	6. 5	14. 83	50. 72	62. 06			9. 49	12. 00

E - A - I - T System

DISK FILE = STATISTICS DATA
 OPERATOR = PLG
 MATERIAL ID = V-6
 SAMPLE ID = V6

COMMENT = ZHENG
 RUN COMMENT = Probe toward sealant (in)

02-23-1993

LOAD CELL =
 TUP RADIUS =
 DART WEIGHT =

10:51:12
 500-3933
 0.750 in
 35.00 lbs

TEST

	D	SPEAK LOAD	L	E	PEAK D	-->	ZERO E	TOTAL D	E
9029-3. S01	1. 410	42. 6	2. 98	0. 365	1. 23			1. 775	4. 21
9029-3. S02	1. 535	41. 6	3. 26	0. 350	1. 15			1. 885	4. 41
9029-3. S03	1. 500	45. 6	3. 65	0. 255	0. 91			1. 755	4. 56
9029-3. S04	1. 610	48. 5	3. 87	0. 035	0. 07			1. 645	3. 95
9029-3. S05	1. 460	47. 3	3. 41	0. 085	0. 26			1. 545	3. 66
9029-3. S06	1. 635	44. 5	3. 83	0. 100	0. 32			1. 735	4. 15
AVG	1. 525	45. 0	3. 50	0. 198	0. 66			1. 723	4. 16
STD DEV	0. 087	2. 6	0. 35	0. 14	0. 50			2. 12	0. 32
COEF VAR	5. 68	5. 9	9. 97	72. 43	76. 11			5. 76	7. 69

9029-3.

Layer Thickness, microscope, mil.

	<u>ext</u>	<u>core</u>	<u>in</u>	<u>total</u>
1.	.52	.38	1.18	2.68
	.61	.36	1.09	2.06
	.60	.38	1.28	2.26
	.47	.42	1.21	2.10
	<u>.51</u>	<u>.47</u>	<u>1.07</u>	<u>2.05</u>
Average	<u>.54</u>	<u>.40</u>	<u>1.17</u>	<u>2.11</u>
2.	.94	.43	.86	2.23
	.73	.31	.95	1.99
	.74	.40	.89	2.03
	.64	.53	1.01	2.18
	.65	.59	.88	2.12
	.79	.57	.97	2.33
Average	<u>.75</u>	<u>.47</u>	<u>.93</u>	<u>2.15</u>
3.	.90	.47	1.08	2.45
	.78	.44	1.02	2.24
	.73	.46	1.26	2.45
	.61	.47	1.25	2.33
	.59	.58	1.24	2.41
	.73	.55	1.18	2.46
Average	<u>.72</u>	<u>.49</u>	<u>1.17</u>	<u>2.38</u>
4.	.72	.49	1.05	2.26
	.58	.51	1.25	2.34
	.62	.43	1.22	2.27
	.68	.45	1.29	2.42
	.66	.42	1.07	2.15
	.76	.38	1.03	2.17
Average	<u>.67</u>	<u>.45</u>	<u>1.15</u>	<u>2.27</u>

9029-

	<u>mt</u>	<u>ccm</u>	<u>in.</u>	<u>total</u>
5.	.70	.33	1.35	2.38
	.61	.30	1.20	2.11
	.55	.40	1.18	2.13
	.72	.42	1.28	2.42
	.47	.45	1.08	2.00
	.59	.43	1.16	2.15
<u>Average</u>	<u>.61</u>	<u>.39</u>	<u>1.21</u>	<u>2.21</u>
6.	.63	.43	1.12	2.18
	.52	.46	1.16	2.14
	.45	.35	1.27	2.07
	.60	.35	1.21	2.16
	.62	.45	1.17	2.24
	.65	.44	1.24	2.33
<u>Average</u>	<u>.58</u>	<u>.41</u>	<u>1.19</u>	<u>2.18</u>